

AVIATION WEEK

A MCGRAW-HILL PUBLICATION

NOVEMBER 28, 1949



MID-CONTINENT

AIRLINES USES

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SPARK PLUGS

TO ASSURE DEPENDABLE PERFORMANCE...

Reliable ignition calls for the use of
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Mr. Charles H. Dolson
Vice President of Operations
Delta Air Lines Inc.

¹"We are glad to say that since December 1, 1948 we have flown over 27 million passengers miles with our Douglas DC-6's equipped with Aeslon built superchargers and drive assemblies. The excellent equipment has enabled us to give our passengers greater safety and added comfort."

Axelson-built aircraft components—hydraulic landing gears—cabin superchargers—gears and gearing mechanisms—are recognized around the world for highest precision quality wherever military or civilian planes fly. Axelson's complete mechanical facilities, expert craftsmanship and rigid standards of existing production are augmented by a competent engineering staff experienced and capable in helping aircraft manufacturers develop component parts for tomorrow's planes.

Through the years, Axelson has been noted as one of the country's foremost manufacturers of heavy-duty precision engine lathes and gauges. Hundreds of these Axelson lathes are currently in use by the aircraft industry.



AXELSON *Aircraft Division*

AXELSON MANUFACTURING COMPANY

6165 South Boyle Avenue, Los Angeles 11, California



References



Blackburn



James Harding



Keywords



Discussion

5 more airlines join the switch to B.F. Goodrich brakes

28) DC-1s now operating were economically for 17 airlines.

LAST spring, we announced that 11 U.S. airlines had switched 246 DC-3s to B-7 Goodrich brakes. Now five more airlines (above) have reported a changeover — and still others are on order.

Main reason is the lower maintenance cost—a benefit that will increase when these airplanes are converted to Jett DC-3s.

The simple design of the brake eliminates many extra parts found in

other tasks. The only tools needed to adjust it are a screwdriver and pliers. And the full auto braking action of the expander tube spreads wear evenly, lengthens brake life. Maintenance man-hours, on-shop time and replacement costs are all cut.

What's more, B. F. Goodrich Expander Tube brakes save weight. They can be designed lighter for a given amount of kinetic energy than any other brake. They cannot lock or grab. They expand smoothly—no sudden jolts. They take heavy overloads better in emergencies.

BFG assemblies—wheel, brake, tire and tube—offer special advantages for military and police forces as well as on airliners. Standard assemblies are available for quick delivery and a new assembly can be engineered for any design on your driving boards. Write to The B. F. Goodrich Company, Aeronautical Division, Akron, Ohio.

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What this means to you is that you can replace or repair ignition shielding on your engines without time or delay, simply by calling on TITEFLEX. We have supplied so many engines with shielding in the form of original equipment that we are organized to give you immediate service on your maintenance requirements. Whether you need complete assemblies or component parts—call on TITEFLEX for expedient help.

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THE AVIATION WEEK

Atlantic Air Power—A Staff Report

The completion necessary for building a common defense system for Atlantic Europe is clearly a major task. Such a system is essential for the protection of the Atlantic, and it is a task that will require the cooperation of all the nations of the Atlantic. The task is not only to build a common defense system, but also to build a common political system. The task is not only to build a common defense system, but also to build a common political system.

► **Air Power Key**—One of the major requirements for a common defense system for Atlantic Europe is the development of a common air power. The task is not only to build a common defense system, but also to build a common political system. The task is not only to build a common defense system, but also to build a common political system.

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night attacks by RAF bombers and USAF B-29 Superfortresses. The task is not only to build a common defense system, but also to build a common political system. The task is not only to build a common defense system, but also to build a common political system.

► **Police Problem**—One of the major requirements for a common defense system for Atlantic Europe is the development of a common air power. The task is not only to build a common defense system, but also to build a common political system. The task is not only to build a common defense system, but also to build a common political system.

The Atlantic Air Power problem is really with only the physical resources of the NATO air forces. The task is not only to build a common defense system, but also to build a common political system. The task is not only to build a common defense system, but also to build a common political system.

The problem of meeting Europe's needs in the air is clearly made up of that of equipping the command and control of the air force and the command and control of the air force. The task is not only to build a common defense system, but also to build a common political system. The task is not only to build a common defense system, but also to build a common political system.

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The French believe in the operational flexibility, low cost and high performance made by the French Air Force. The task is not only to build a common defense system, but also to build a common political system. The task is not only to build a common defense system, but also to build a common political system.

The need for more Atlantic air power is clearly made up of that of equipping the command and control of the air force and the command and control of the air force. The task is not only to build a common defense system, but also to build a common political system. The task is not only to build a common defense system, but also to build a common political system.

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That's exactly true of the new Narco VTA-2 transmitter. Now you can use two of these "body-bus" channels, because the VTA-2 has three low-power output channels, three times that of the VTA-1, yet it weighs only 2.5 lbs. And the VTA-2 has eight channels where formerly there were only two. In addition, two more inputs have been substituted for outputs (still it takes four cables). You get all this together with our new transmitter, in also using just one channel in the VTA-1, yet it weighs only 2.5 lbs.

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AVIATION CALENDAR

Nov. 20-Dec. 1-20th annual meeting, American Society of Machinists Engineers, Hotel Statler, New York, N.Y.

Nov. 28-Dec. 10-Eagle Conference, final meeting for 1976, sponsored by Air Transport Association, Beach Hotel, Chicago.

Nov. 30-Dec. 2-Annual meeting, South Atlantic Regional Show, Anaheim, Calif. New York, New York.

Nov. 30-Dec. 3-Dinner Report and Aerial Spray Conference, Miami, Fla., Kansas.

Dec. 4-18-First Convergence Aerial Congress, sponsored by Philadelphia chapter of IAF and American Helicopter Society, in Philadelphia.

Dec. 15-20th Transport Air Meet at London periodicals, Carlow Hotel, Washington, D.C.

Dec. 16-17-19th National aviation meeting, sponsored by the National Aeronautics Assn., Hotel Statler, Washington, D.C.

Dec. 17-18-19th of the Aeronautical Sciences 19th annual Wright Brothers Forum, U.S. Chamber of Commerce Building, Washington, D.C.

Dec. 19-Jan. 7, 1977-Winter Wing Meet, sponsored by the Mount Pinchot Hotel and Golf Club, Mt. Pinchot, Pa.

Jan. 10-12, 1977-Florida Thru Nightingale Club Annual Dinner & Fables, Miami, Fla.

Jan. 13-15-Mt. American Air Museum, Maine.

Jan. 16-27-Miami-Hawaii Air Center for general aviation scheduled in Florida Air Pilot, Fla.

Jan. 18-19-Plant Manufacturers Show, sponsored by American Society of Mechanical Engineers and the Society for the Advancement of Manufacturing, Cleveland, Ohio.

Jan. 21-22-University of Illinois second annual Customs Spain Questionnaire, Urbana, Ill.

Jan. 23-24-25th annual Hanes Night, held in Hialeah, Fla., New York, N.Y.

Jan. 25-26-15th annual meeting, International Aviation Hotel, New York, N.Y.

Jan. 26-28th annual, ICAO Council, Montreal.

Feb. 10-12-National Sportswear Show, Grand Central Palace, New York, N.Y.

Feb. 27-Mar. 4-Spring meeting, American Society for Testing Materials, Hotel Waldorf, New York, N.Y.

Mar. 6-8-7th annual meeting, American Road Builders Assn., Northbrook, Ill.

Mar. 24-18th annual Physics Experiments, sponsored by Society of the Physics Teacher, New York, N.Y.

PICTURE CREDITS
12-13 (left)-Erich Albert; (right)-Hans
14-15-16-17-18-19-20-21-22-23-24-25-26-27-28-29-30-31-32-33-34-35-36-37-38-39-40-41-42-43-44-45-46-47-48-49-50-51-52-53-54-55-56-57-58-59-60-61-62-63-64-65-66-67-68-69-70-71-72-73-74-75-76-77-78-79-80-81-82-83-84-85-86-87-88-89-90-91-92-93-94-95-96-97-98-99-100-101-102-103-104-105-106-107-108-109-110-111-112-113-114-115-116-117-118-119-120-121-122-123-124-125-126-127-128-129-130-131-132-133-134-135-136-137-138-139-140-141-142-143-144-145-146-147-148-149-150-151-152-153-154-155-156-157-158-159-160-161-162-163-164-165-166-167-168-169-170-171-172-173-174-175-176-177-178-179-180-181-182-183-184-185-186-187-188-189-190-191-192-193-194-195-196-197-198-199-200-201-202-203-204-205-206-207-208-209-210-211-212-213-214-215-216-217-218-219-220-221-222-223-224-225-226-227-228-229-230-231-232-233-234-235-236-237-238-239-240-241-242-243-244-245-246-247-248-249-250-251-252-253-254-255-256-257-258-259-260-261-262-263-264-265-266-267-268-269-270-271-272-273-274-275-276-277-278-279-280-281-282-283-284-285-286-287-288-289-290-291-292-293-294-295-296-297-298-299-300-301-302-303-304-305-306-307-308-309-310-311-312-313-314-315-316-317-318-319-320-321-322-323-324-325-326-327-328-329-330-331-332-333-334-335-336-337-338-339-340-341-342-343-344-345-346-347-348-349-350-351-352-353-354-355-356-357-358-359-360-361-362-363-364-365-366-367-368-369-370-371-372-373-374-375-376-377-378-379-380-381-382-383-384-385-386-387-388-389-390-391-392-393-394-395-396-397-398-399-400-401-402-403-404-405-406-407-408-409-410-411-412-413-414-415-416-417-418-419-420-421-422-423-424-425-426-427-428-429-430-431-432-433-434-435-436-437-438-439-440-441-442-443-444-445-446-447-448-449-450-451-452-453-454-455-456-457-458-459-460-461-462-463-464-465-466-467-468-469-470-471-472-473-474-475-476-477-478-479-480-481-482-483-484-485-486-487-488-489-490-491-492-493-494-495-496-497-498-499-500-501-502-503-504-505-506-507-508-509-510-511-512-513-514-515-516-517-518-519-520-521-522-523-524-525-526-527-528-529-530-531-532-533-534-535-536-537-538-539-540-541-542-543-544-545-546-547-548-549-550-551-552-553-554-555-556-557-558-559-560-561-562-563-564-565-566-567-568-569-570-571-572-573-574-575-576-577-578-579-580-581-582-583-584-585-586-587-588-589-590-591-592-593-594-595-596-597-598-599-600-601-602-603-604-605-606-607-608-609-610-611-612-613-614-615-616-617-618-619-620-621-622-623-624-625-626-627-628-629-630-631-632-633-634-635-636-637-638-639-640-641-642-643-644-645-646-647-648-649-650-651-652-653-654-655-656-657-658-659-660-661-662-663-664-665-666-667-668-669-670-671-672-673-674-675-676-677-678-679-680-681-682-683-684-685-686-687-688-689-690-691-692-693-694-695-696-697-698-699-700-701-702-703-704-705-706-707-708-709-710-711-712-713-714-715-716-717-718-719-720-721-722-723-724-725-726-727-728-729-730-731-732-733-734-735-736-737-738-739-740-741-742-743-744-745-746-747-748-749-750-751-752-753-754-755-756-757-758-759-760-761-762-763-764-765-766-767-768-769-770-771-772-773-774-775-776-777-778-779-780-781-782-783-784-785-786-787-788-789-790-791-792-793-794-795-796-797-798-799-800-801-802-803-804-805-806-807-808-809-810-811-812-813-814-815-816-817-818-819-820-821-822-823-824-825-826-827-828-829-830-831-832-833-834-835-836-837-838-839-840-841-842-843-844-845-846-847-848-849-850-851-852-853-854-855-856-857-858-859-860-861-862-863-864-865-866-867-868-869-870-871-872-873-874-875-876-877-878-879-880-881-882-883-884-885-886-887-888-889-890-891-892-893-894-895-896-897-898-899-900-901-902-903-904-905-906-907-908-909-910-911-912-913-914-915-916-917-918-919-920-921-922-923-924-925-926-927-928-929-930-931-932-933-934-935-936-937-938-939-940-941-942-943-944-945-946-947-948-949-950-951-952-953-954-955-956-957-958-959-960-961-962-963-964-965-966-967-968-969-970-971-972-973-974-975-976-977-978-979-980-981-982-983-984-985-986-987-988-989-990-991-992-993-994-995-996-997-998-999-1000-1001-1002-1003-1004-1005-1006-1007-1008-1009-1010-1011-1012-1013-1014-1015-1016-1017-1018-1019-1020-1021-1022-1023-1024-1025-1026-1027-1028-1029-1030-1031-1032-1033-1034-1035-1036-1037-1038-1039-1040-1041-1042-1043-1044-1045-1046-1047-1048-1049-1050-1051-1052-1053-1054-1055-1056-1057-1058-1059-1060-1061-1062-1063-1064-1065-1066-1067-1068-1069-1070-1071-1072-1073-1074-1075-1076-1077-1078-1079-1080-1081-1082-1083-1084-1085-1086-1087-1088-1089-1090-1091-1092-1093-1094-1095-1096-1097-1098-1099-1100-1101-1102-1103-1104-1105-1106-1107-1108-1109-1110-1111-1112-1113-1114-1115-1116-1117-1118-1119-1120-1121-1122-1123-1124-1125-1126-1127-1128-1129-1130-1131-1132-1133-1134-1135-1136-1137-1138-1139-1140-1141-1142-1143-1144-1145-1146-1147-1148-1149-1150-1151-1152-1153-1154-1155-1156-1157-1158-1159-1160-1161-1162-1163-1164-1165-1166-1167-1168-1169-1170-1171-1172-1173-1174-1175-1176-1177-1178-1179-1180-1181-1182-1183-1184-1185-1186-1187-1188-1189-1190-1191-1192-1193-1194-1195-1196-1197-1198-1199-1200-1201-1202-1203-1204-1205-1206-1207-1208-1209-1210-1211-1212-1213-1214-1215-1216-1217-1218-1219-1220-1221-1222-1223-1224-1225-1226-1227-1228-1229-1230-1231-1232-1233-1234-1235-1236-1237-1238-1239-1240-1241-1242-1243-1244-1245-1246-1247-1248-1249-1250-1251-1252-1253-1254-1255-1256-1257-1258-1259-1260-1261-1262-1263-1264-1265-1266-1267-1268-1269-1270-1271-1272-1273-1274-1275-1276-1277-1278-1279-1280-1281-1282-1283-1284-1285-1286-1287-1288-1289-1290-1291-1292-1293-1294-1295-1296-1297-1298-1299-1300-1301-1302-1303-1304-1305-1306-1307-1308-1309-1310-1311-1312-1313-1314-1315-1316-1317-1318-1319-1320-1321-1322-1323-1324-1325-1326-1327-1328-1329-1330-1331-1332-1333-1334-1335-1336-1337-1338-1339-1340-1341-1342-1343-1344-1345-1346-1347-1348-1349-1350-1351-1352-1353-1354-1355-1356-1357-1358-1359-1360-1361-1362-1363-1364-1365-1366-1367-1368-1369-1370-1371-1372-1373-1374-1375-1376-1377-1378-1379-1380-1381-1382-1383-1384-1385-1386-1387-1388-1389-1390-1391-1392-1393-1394-1395-1396-1397-1398-1399-1400-1401-1402-1403-1404-1405-1406-1407-1408-1409-1410-1411-1412-1413-1414-1415-1416-1417-1418-1419-1420-1421-1422-1423-1424-1425-1426-1427-1428-1429-1430-1431-1432-1433-1434-1435-1436-1437-1438-1439-1440-1441-1442-1443-1444-1445-1446-1447-1448-1449-1450-1451-1452-1453-1454-1455-1456-1457-1458-1459-1460-1461-1462-1463-1464-1465-1466-1467-1468-1469-1470-1471-1472-1473-1474-1475-1476-1477-1478-1479-1480-1481-1482-1483-1484-1485-1486-1487-1488-1489-1490-1491-1492-1493-1494-1495-1496-1497-1498-1499-1500-1501-1502-1503-1504-1505-1506-1507-1508-1509-1510-1511-1512-1513-1514-1515-1516-1517-1518-1519-1520-1521-1522-1523-1524-1525-1526-1527-1528-1529-1530-1531-1532-1533-1534-1535-1536-1537-1538-1539-1540-1541-1542-1543-1544-1545-1546-1547-1548-1549-1550-1551-1552-1553-1554-1555-1556-1557-1558-1559-1560-1561-1562-1563-1564-1565-1566-1567-1568-1569-1570-1571-1572-1573-1574-1575-1576-1577-1578-1579-1580-1581-1582-1583-1584-1585-1586-1587-1588-1589-1590-1591-1592-1593-1594-1595-1596-1597-1598-1599-1600-1601-1602-1603-1604-1605-1606-1607-1608-1609-1610-1611-1612-1613-1614-1615-1616-1617-1618-1619-1620-1621-1622-1623-1624-1625-1626-1627-1628-1629-1630-1631-1632-1633-1634-1635-1636-1637-1638-1639-1640-1641-1642-1643-1644-1645-1646-1647-1648-1649-1650-1651-1652-1653-1654-1655-1656-1657-1658-1659-1660-1661-1662-1663-1664-1665-1666-1667-1668-1669-1670-1671-1672-1673-1674-1675-1676-1677-1678-1679-1680-1681-1682-1683-1684-1685-1686-1687-1688-1689-1690-1691-1692-1693-1694-1695-1696-1697-1698-1699-1700-1701-1702-1703-1704-1705-1706-1707-1708-1709-1710-1711-1712-1713-1714-1715-1716-1717-1718-1719-1720-1721-1722-1723-1724-1725-1726-1727-1728-1729-1730-1731-1732-1733-1734-1735-1736-1737-1738-1739-1740-1741-1742-1743-1744-1745-1746-1747-1748-1749-1750-1751-1752-1753-1754-1755-1756-1757-1758-1759-1760-1761-1762-1763-1764-1765-1766-1767-1768-1769-1770-1771-1772-1773-1774-1775-1776-1777-1778-1779-1780-1781-1782-1783-1784-1785-1786-1787-1788-1789-1790-1791-1792-1793-1794-1795-1796-1797-1798-1799-1800-1801-1802-1803-1804-1805-1806-1807-1808-1809-1810-1811-1812-1813-1814-1815-1816-1817-1818-1819-1820-1821-1822-1823-1824-1825-1826-1827-1828-1829-1830-1831-1832-1833-1834-1835-1836-1837-1838-1839-1840-1841-1842-1843-1844-1845-1846-1847-1848-1849-1850-1851-1852-1853-1854-1855-1856-1857-1858-1859-1860-1861-1862-1863-1864-1865-1866-1867-1868-1869-1870-1871-1872-1873-1874-1875-1876-1877-1878-1879-1880-1881-1882-1883-1884-1885-1886-1887-1888-1889-1890-1891-1892-1893-1894-1895-1896-1897-1898-1899-1900-1901-1902-1903-1904-1905-1906-1907-1908-1909-1910-1911-1912-1913-1914-1915-1916-1917-1918-1919-1920-1921-1922-1923-1924-1925-1926-1927-1928-1929-1930-1931-1932-1933-1934-1935-1936-1937-1938-1939-1940-1941-1942-1943-1944-1945-1946-1947-1948-1949-1950-1951-1952-1953-1954-1955-1956-1957-1958-1959-1960-1961-1962-1963-1964-1965-1966-1967-1968-1969-1970-1971-1972-1973-1974-1975-1976-1977-1978-1979-1980-1981-1982-1983-1984-1985-1986-1987-1988-1989-1990-1991-1992-1993-1994-1995-1996-1997-1998-1999-2000-2001-2002-2003-2004-2005-2006-2007-2008-2009-2010-2011-2012-2013-2014-2015-2016-2017-2018-2019-2020-2021-2022-2023-2024-2025-2026-2027-2028-2029-2030-2031-2032-2033-2034-2035-2036-2037-2038-2039-2040-2041-2042-2043-2044-2045-2046-2047-2048-2049-2050-2051-2052-2053-2054-2055-2056-2057-2058-2059-2060-2061-2062-2063-2064-2065-2066-2067-2068-2069-2070-2071-2072-2073-2074-2075-2076-2077-2078-2079-2080-2081-2082-2083-2084-2085-2086-2087-2088-2089-2090-2091-2092-2093-2094-2095-2096-2097-2098-2099-2100-2101-2102-2103-2104-2105-2106-2107-2108-2109-2110-2111-2112-2113-2114-2115-2116-2117-2118-2119-2120-2121-2122-2123-2124-2125-2126-2127-2128-2129-2130-2131-2132-2133-2134-2135-2136-2137-2138-2139-2140-2141-2142-2143-2144-2145-2146-2147-2148-2149-2150-2151-2152-2153-2154-2155-2156-2157-2158-2159-2160-2161-2162-2163-2164-2165-2166-2167-2168-2169-2170-2171-2172-2173-2174-2175-2176-2177-2178-2179-2180-2181-2182-2183-2184-2185-2186-2187-2188-2189-2190-2191-2192-2193-2194-2195-2196-2197-2198-2199-2200-2201-2202-2203-2204-2205-2206-2207-2208-2209-2210-2211-2212-2213-2214-2215-2216-2217-2218-2219-2220-2221-2222-2223-2224-2225-2226-2227-2228-2229-2230-2231-2232-2233-2234-2235-2236-2237-2238-2239-2240-2241-2242-2243-2244-2245-2246-2247-2248-2249-2250-2251-2252-2253-2254-2255-2256-2257-2258-2259-2260-2261-2262-2263-2264-2265-2266-2267-2268-2269-2270-2271-2272-2273-2274-2275-2276-2277-2278-2279-2280-2281-2282-2283-2284-2285-2286-2287-2288-2289



BEECH AIRCRAFT CORP.'s Model 56 Twin Bonanza has been successfully flight tested and will sell for about \$50,000.

New Two-Engine Lightplane Market Ahead

With models already developed, four firms are readying all-out 1950 sales campaigns.

By Alexander McSwery

Prospects for new and virtually untapped military and civil markets for small two-engine airplanes are stimulating a new wave of two-engine plane development with four companies already preparing their entries for a 1950 sales drive.

• **Beech Aircraft Corp.** last week passed out its initial lead in the competition after successful test flights of the new Twin Bonanza. Beech Model 56 at Wichita.

• **Piper Aircraft Corp.**, only other major manufacturer known to be preparing an entry in the small two-engine field, hopes to fly its first twin version of the Hurricane Register in January at Lock Haven, Pa.

Two other established competitors in the same field are:

• **Bonanza Aircraft Corp.**, now building a production Model 290, single-engine Register, with emergency seating provision in the No. 3 Register sold to Piper. Now production model is expected to be in July.

• **Avco Design and Engineering Corp.**, which is pushing its new Comanche (Aviation Week, July 21) through an evaluation in Colver Cove, and hopes to get it into production at Oklahoma City.

An Aviation Week survey of other

principal manufacturers produced the following reports:

• **Corona Aircraft Co.**, is not building and does not contemplate building at the time a two-engine airplane. Unofficial reports were that Corona had a high-wing, two-engine aircraft under development in early design stage.

• **Ryan Aircraft Co.**, has no plans for a two-engine plane for spring 1950. Unofficial reports were that Ryan had made engineering studies of a Twin Bonanza but had not committed company even to prototype construction.

• **Aerovox Aircraft Corp.**, Midland, Ohio, does not intend to produce a two-engine plane this year. Considered having two Comanches, but decided against it.

• **Engineering & Research Corp.**, does not intend to revive the Ercoupe, two-engine, four-place, all-metal positive design of Paul Witt, recently completed but never flown.

• **Twin Engineering and Manufacturing Co.**, has no plans for a two-engine plane for 1950.

These manufacturers are seen for the small two-engine plane for general transport, for replacement of single-engine planes and other widespread emergency on short finalities, and for early personal transport use.

Super Navion

Instead of going into the two-engine competition, Ryan Aircraft Co. is concentrating a new higher-powered Super Navion for 1950, is a competition line to its continuing production of the de luxe Navion in the principal model.

Main difference will be in the 260 hp, Lycoming CO-435-C2 engine, which gives the plane an improved performance, quoted as 170 mph cruising speed, 1230 ft. max. rate of climb, 950 ft. takeoff run, and 750 ft. climb in 50 ft. obstacle from a standing start, normal stage 640 mi., or maximum economy range of 900 mi. Show flight and good handling characteristics of the plane have not been altered at a result of the higher power, the company states.

The Navion Super 260 will sell for less than \$14,000 completely equipped. Presumably the de luxe 265 hp Continental-powered Navion will continue at \$10,995. Deposits for the Super 260 are now being accepted by Ryan distributors with first deliveries scheduled in March.

Externally the two planes are clearly similar except for different paint and finishes.



CONVENTIONAL SINGLE TAILFIN on Twin Bonanza replaces V tail of smaller Bonanza. Craft is rated for 180 mph cruising speed.

• **Military Competition—Army** Field Forces is making preliminary arrangements for a competition to supply small two-engine transports to spend its personal movements. Fast report to this requirement was given last May at a Wichita lightplane engineering meeting by AAF representatives. Competition is expected to be held early next Spring.

The only two-engine personal transport currently available to the service is the two-engine Beech Model 18, which is also the most popular civilian transport. The new four-cylinder plane, however, is smaller, cost less than half as much as the Model 18, and have much smaller powerplants, with resulting operational economy. These firms also would have some Navy and Air Force market prospects.

Generally speaking, the design problem in the new two-engine field is to provide a good two-engine plane with cruising speed in the 150-180 mph range, capable of landing at least four persons, with good single-engine performance and acceptable under instrument flight conditions.

• **Twin Bonanza Pilot—Chief test pilot Vern Carleton** took the airplane Twin Bonanza off the Beech Airport at Wichita at 70 mph, with a 500 ft. takeoff run, carrying a 4950 lb. load.

Landing at the same speed required only a little more runway. Over he got the plane up to 200 mph over the field as a downwind leg at only 2700 rpm. The plane is rated for a 180 mph cruising speed at 1600 rpm.

Plane is powered with two CO-435 Lycoming 260 hp engines, having Beech propellers. Powerplants were described as "parasitics." Walter J. Beck, company president, and the Twin Bonanza could have a good service



BAUMANN BRIGGARDS uses pusher engines. Paper plane is better version of the plane.



AERO COMMANDER is undergoing CAA tests, results will decide licensing arrangements.

life-cycle engine under full gross weight conditions.

• **500,000** Pre-Post-Pre-Post estimates indicate a price of \$50,000 will be set for the plane, with first deliveries to commercial customers in the early fall of 1950.

Originally planned to use as wing parts of the single-engine Bonanza as possible, the Twin Bonanza has been scaled up to a point where the entire wing profile and cabin structure are about all that can be used interchange-

ably with those of the single-engine plane. The Twin uses the conventional single tail arrangement instead of the V tail which the smaller plane has used. The surfaces of the Twin appear to be smooth and perfect interchangeable with those of the Mentor, Beech's new twin version of the Bonanza.

• **Grand Rapids—Twin Bonanza** wing span is approximately the same as that for the older Twin Bonanza Model 18 (second 45 ft.). The gross Lycoming engines develop 260 hp for takeoff at

his distribution philosophy of putting out a small but quantity of the value new plane for thorough service testing before a large quantity production. In decisions as to the deal is well on the way to completion.

► **Finance Plan**—Details of the Aerotec refinancing arrangement as disclosed by Lusk include:

• **Reconstruction Finance Corp.** has approved an additional \$200,000 loan.

• **Comet** "publicly granted" Middlemore citizens have obligated themselves to match the RFC loan.

• **Stockholders** have approved a new \$400,000 issue of 75% price participation preferred stock.

• **Preferred conditions** with claims totaling approximately \$1 million have agreed to accept approximately 200,000 shares of the 54% new stock issue in conjunction of their claims.

• **Aerotec** had notified earlier in Oct. 31 totaling \$1.7 million, previously in Air Force and Army administration.

• **The third** of the Aerotec (Aerotec) acquisition plan from earlier with deposits for airplanes, totaling over \$400,000, at a special regional meeting Nov. 15.

► **Biggest single step** in the refinancing was also at the conjunction with preferred creditors, which in effect wrote off 80% of their claims and "had an extremely favorable" effect on the company's surplus," the company stated.

B-29s Grounded for Modification Work

U.S. Air Force last week grounded a large portion of its operational Boeing B-29 Superfortresses.

The grounding order affected:

• All B-29s being held for testing by Strategic Air Command.

• All B-29s of the 99th Group stationed at Guam.

• All other B-29s that have not had their Wright R-3350 engines equipped with fuel injection and other modifications as long been assigned to main combat and takeoff weights.

USAF currently has about 400 B-29 operational and additional ones scheduled that about half of them would be affected by the grounding order. USAF has currently experienced no evidence of operational loss among its B-29 groups but in any of the order could be forced directly to expect trouble. The bottom line has been unduly seriously. Many were in SAC and the 99th Group where there have been flying missions range can cause that require extensive takeoff weights and long periods at altitude.

► **Report**—Washington, according to has been stated last at Air Materiel Command's Oklahoma City depot with parts purchased from Wright Aircraft Co. Boeing's Wright plant has been under contract and component modifications on the B-29. The AMC depot overhaul system has been under severe criticism in Pentagon circles over its record during the Berlin airlift when several C-54 maintenance was pulled from its depot and given to civilian contractors.

► **Military Air Transport Service** reported that the civilian subcontracting of its C-54 fleet produced better work faster and at considerably less cost.

The Defense Department Management Committee, headed by Gen. Joseph T. McNamara, former AMC commander, has been considering in decision of the depot system as a means of effecting economy in the military budget and extending the service of civilian contract workers in military service.

► **Work Shift**—Chicago, the B-29 maintenance program was scheduled for Boeing, Bell Aircraft Corp. and the Glenn L. Martin Co., but AMC stated work scheduled for Bell and Martin in its depot on the grounds of "aircraft security."

The B-29s are expected to remain grounded until technical inspection tests can suggest the heavily stressed fuselage and the engine maintenance program can be completed.

Three Big Fields Bar Fighter Planes

Tight-type aircraft, whether or not converted to civilian use, have been barred from using Washington National Airport, LaGuardia Field and New York International Airport.

This action, taken by Washington by the Civil Aeronautics Administration and in New York by the Port of New York Authority, followed the mid-air crash of an Eastern Air Lines DC-4 and a P-51 on Nov. 1 at Washington National Airport, including commercial and subsequent reports of near collisions in that area. CAA modified its earlier order which would have kept all aircraft type aircraft from Washington National Airport, including commercial, but was at airports by business concern.

► **Non-EAL Incident**—One of the latest reports on a "near miss" over the Washington area involved an Eastern Air Lines DC-4 and a two-engine Navy Beechcraft. The Navy acknowledged the incident but said the EAL plane, bound from Richmond to Newark, was flying through the center of the stacked Delagies, Va., proving ground, danger area—some miles from the nearest authorized airport.

The Navy pilot, who was making practice landing run, and his first mate the accident in identity it and get its registration number so that a civil plane could be made to CAA.

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FINANCIAL

Stock Ownership By Officers-Directors

	Average Dollar Value Held (in \$1000)	Percentage Of Outstanding Shares Held
Aircraft Industry		
Boeing	\$5,761	25.92
General	2,061	15.62
Lockheed	1,841	4.61
Boeing	174	0.08
Douglas	936	0.77
North American	114	0.05
North American	10	0.01
Republic	2	0.002
Air Transport Industry		
Eastern	\$1,200	5.41
Northeast	360	1.32
Pan American	978	1.14
American	242	0.42
United	47	0.03

Survey Analyzes Aviation Group

Management's equity holdings appraised. Sustained aircraft industry and airline earnings seen.

An interesting appraisal of the aviation group is revealed in the current annual survey released by the Value Line, an investment advisory service. A new feature analyzes the stock ownership of the management of the companies and points out which of the companies may carry the burden of their management's own money.

This is a significant undertaking. Corporate trends in recent years, making for broader distribution of ownership among many shareholders, have developed some managements with very small equity holdings and policies going to develop the real ownership interest.

► **Security**—The Value Line has computed the total of management ownership from 1940 to the end of 1945 in terms of both average dollar value and percentage of outstanding shares for a selected group of companies.

These findings as of the 1945 year-end, are summarized in the box above.

An important qualification must be included with the above findings. This is the extent of holdings represented by members of individual stockholders. Frequently, this determination is 60%

of the total. It is known, however, that the Hughes Tool Co. owns about 74 percent of the outstanding stock of TWA, and has a substantial interest in the airline's management.

► **Control Factors**—Nevertheless, the small percentage stock ownership through which managements can control of large corporate enterprises is particularly noteworthy. A test for one test early evidence. Hence, as long as a minority interest is maintained, management can, more or less, perpetuate themselves in office. The aircraft industry, however, has seen dissenting groups successfully challenge the policies of its own managements in recent years, raising the industry's public interest in its management.

► **According to the Value Line** companies, United Aircraft, for example, with total resources of more than \$170 million, is controlled by a group owning an average of \$10,000 of the new group's resources. By the same token, Republic Aviation provides a more striking contrast, with more than \$15.5 million in total assets controlled by a group owning an average of \$200.

Nearly all companies are reported to have shown a similar officer-director ownership at the end of 1945 than at the close of 1940.

In reviewing the outlook for the aircraft industry, the investment advisory service declares that a high level of interest participation among shareholders with the first contract of the first 1950 military appropriations. Strength of most aircraft manufacturing companies is expected to rise moderately in 1950. Aircraft usually require from one to three years for delivery in quantity after initial orders are placed. Operations of the Value Line service that a considerable period must elapse before values can be translated into earnings.

The impact of last year's order was not felt in 1948 and through this year, the greatest improvement, according to the advisory service, will be shown in 1950 results. Similarly, orders placed this year, will probably affect 1951 earnings.

► **Performance**—Consolidating all figures on the aircraft industry, Value Line declares that performance of the individual companies will be by no means uniform, despite the generally favorable outlook for the industry. The degree of efficiency with which the various companies translate holdings into sales and earnings will vary with the nature of their orders and the current level of their management. Among companies expected to make favorable earnings showings in 1950 are Boeing, United Aircraft, Convair and Lockheed.

Analysing current developments in the airline group, the Value Line declares that profits of air carriers showing a high percentage of total pay to total revenues might be regarded with some skepticism in view of the fact that they have, consequently, increased in the consolidated earnings. While United and TWA received special payments last year to meet them in their difficult financial situation, companies that far in 1949 reveal a healthy recovery without benefit of aid pay. In fact, both of these carriers are reported receiving monthly less aid pay than a year ago.

However, Value Line credits that airlines compensation for carrying the mail is reduced sharply in 1950, which they consider unfairly, a serious deterioration of the industry's public interest in its management.

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NEW PUNCH FOR SABRE

North American's F-84A Sabre fighter in flight. It is the first of its kind to have a new instrument of sight 5 ft. in length shown here being tested by the Air Force.

At Fort Benning, Standard instrument at the Sabre machine guns mounted on both sides of the nose is visible. Later version of the F-84B will have a solid nose to house night fighting units and Sabre as in line on the side of the fuselage.

of the F-84B will have a solid nose to house night fighting units and Sabre as in line on the side of the fuselage.

AIR FORCE CONTRACTS

New Contracts Exceed \$70 Million

GM division, North American lead in AMC awards for September, with bombing equipment largest item.

An Material Command headquarters and Wilson Laboratories entered into contract worth \$76,714,116 in September, with the largest single order to the AC Spark Plug Division of General Motors Corp., \$19,249,471 for bombing navigational computers.

Second largest single contract was for \$14 million to North American Aviation, Inc. for search and equipment development on guided missiles. Third largest single contract of the month was signed with Sperry Gyroscope Co., \$15,778,771 for bombing navigational computers.

These orders put those companies one, two, three in volume of orders for September. AEC's total was \$17,126,687, NAA's, \$6,668,594, and Sperry's \$7,208,770.

Contract Breakdown.—During September, AMC negotiated 231 contracts worth \$76,227,017 and let 127 contracts valued at \$1,963,235 after formal advertising. Wilson Lab. had \$10,341,917, G. M. negotiated four contracts worth \$13,587, and awarded two worth \$2425 after advertising.

Complete list of September awards and awards of \$1000 by AMC and Wilson Lab follows, with the date being the estimated completion date of the contract.

More Than \$100,000

AC Spark Plug Division, General Motors Corp., 10000, main parts and mobile engine parts for F-104, 10000, Oct. 1959, \$19,249,471; bombing navigational computers and associated equipment, 10000, Oct. 1959, \$15,778,771.

Red Armament Corp., Buffalo, N. Y., for development of missile-computer data system, 10000, Oct. 1959.

Radio Frequency Division, Radio Corp. of America, 10000, Oct. 1959, \$10,341,917; main parts and mobile engine parts for F-104, 10000, Oct. 1959, \$10,341,917.

Wilson Laboratories, Inc., 10000, Oct. 1959, \$7,208,770; main parts and mobile engine parts for F-104, 10000, Oct. 1959, \$7,208,770; main parts and mobile engine parts for F-104, 10000, Oct. 1959, \$7,208,770.

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AVIONICS



Wide variety of data recording and telemetering equipment used in aerospace testing. Bell X-1 (left). Craft was designed to carry



approximately 300 lb. of rocket instrumentation. NACA research aircraft model (right). Fitted with rocket boosters, flown

in preparation for launching, telemetry longitudinal and lateral acceleration from which lift and drag data can be computed.

Report on Telemetering in Aero Research

New science, keyed to need for fast transmission of data, grows rapidly as basic tool in missile studies.

By Robert McLarnon

The small sections of the U. S. have employed 35-38 million worth of special remote equipment since V-2. They are their own research programs on guided missiles and special guided or search aircraft.

Of this total, only about \$2.5 million worth has been obtained by direct purchase from industry. Research has been financed by the spot purchase of the highly specialized instrumentation found in such particular parts of equipment. It is apparent that telemetering equipment will become an increasingly important factor in the aviation industry, provided various standard systems be developed applicable to a wide range of test conditions.

Here is a general summary of the field and an analysis of many of these conditions:

► **Research Instrumentation**—This is one of the pioneer aviation fields, dating back to World War I. Fundamental task this equipment performs is to provide a permanent record of the changes undergone by an aircraft in flight. Briefly, the purpose is to answer the question: "What happens?" regarding any function of the plane and its equipment. This question was usually answered by a test pilot, who made frequent entries during flight, in a log

strapped to his knee. This method had obvious limitations.

One of the first telemetering systems was a motion picture camera focused on the aircraft's instrument panel for a duplicate panel mounted elsewhere in the aircraft, which recorded changes in all readings with time throughout the flight. This method is still in use but, again, it has limitations—bulky weight and complexity.

As piston aircraft became pre-sonic, instrumentation problems became acute. They were further complicated when piston aircraft and rocket speeds and altitudes varied the equipment far beyond the range of accurate observation possible by either ground or air personnel.

► **Telemetering Missiles**—It was to solve the basic problem of "measuring events from a distance" that telemetering became a separate phase of the general aviation science.

There are two general situations in which telemetering systems are satisfactory—when the aircraft is expendable, indicating that records made within the aircraft can be lost in destruction; and when data must be available instantaneously, such as to permit changes in the aircraft controls, power, etc. to prevent premature destruction. It is the first situation which characterizes instrumentation in piston aircraft and

guided missiles, since in the great majority of cases they make only a single flight and are utterly destroyed on impact.

Many small piston aircraft are equipped with parachutes for a safe descent at the conclusion of the powered portion of the flight but such craft still run great risks of destruction or loss through sinking in the ocean, coming down in inaccessible areas, and functioning of the parachute equipment, etc.

A typical telemetering problem, then, is not requiring the transmission of a variety of data in a very short space of time, instantly and safely, efficient operation, lightweight equipment, freedom from interference due to distance of aircraft, freedom from atmospheric effects, such as temperature, moisture, low pressure, etc., independence from high acceleration due to landing or maneuvering, and freedom from vibration—all adding up to the stringent demands of ruggedness, simplicity and dependability.

► **Telemeter's Job**—The telemeter must be able to transmit an extremely wide variety of information quickly and accurately.

In a typical installation the following quantities are required for accurate record and transmission: Aircraft airspeed in still, push and yaw, altitude and speed; movements of ailerons, rudders, elevators, flaps, spoilers, air brakes, etc.; acceleration of the aircraft in the longitudinal, lateral and vertical direc-

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as of our equipment. With us a bit -
they cover the country.*



Right elements of intelligence are held in this grouping (left) of teleprinter equipment mounted in closely restricted space at



NACA 351a transport test vehicle. Interior of teleprinter housing across in rear case of office. Control shift by F&I (right), com-

mon, structural loads on the overall components, or personnel about the aircraft wing, fuselage and empennage, control factors, atmospheric conditions such as temperature, humidity and pressure, operation of special equipment, such as bombing devices, explosive charges, and powerplant conditions such as fuel flow, exhaust pressures, and temperatures.

Because some of these quantities must be measured as often as 100 times per second, it is clear that the teleprinting equipment often must provide readings as high as 2,500 times per second. Each of these readings must be accurately clearly distinguishable on the record and be arranged to present correspondence with a predetermined unit value.

Early types of teleprinting equipment used a single converted channel with each value to be measured being determined by audio modulation frequency change, the change being made through variations in resistance values.

Although this method can accommodate a surprising number of values, an increase in the readings requires a decrease in time resolution so that additional readings are obtained at a cost of reduced accuracy.

When a large volume of information is required of high accuracy, a multi-channel system is necessary.

► **Isolated Scrambling**—First step in the design of a teleprinter is the selection of the values to be measured. While this would appear fundamental, one of the common mistakes in early teleprinter systems was the use of all available ranges of information on all items, resulting in a requirement of accuracy and the recording of much superfluous information of little or no value.

Only those types of information vital to the particular test program should be selected. This permits a more careful selection of the range of values desired from each source and, therefore, greater accuracy.

► **Transducers**—Instruments used to apply the basic information for teleprinting are transducer instruments, such as winged, slotted, gyros, barometers, diaphragm gyros, fuel pressure and similar instruments. Heart of the teleprinter is the transducer, the device used to convert the mechanical energy of these instruments' readings into electrical energy.

One of the simplest forms of transducer is a potentiometer, the wiper contact sliding being used to vary the resistance and, therefore, generate a current. Strain gauges can also be used to generate a current.

These systems are generally classified as generating transducers which can give a very broad family of methods. Included in this type are electron tubes and a wide range of piezoelectric, photoelectric, magnetic, thermoelectric and similar units.

A different approach to the problem is the modulating transducer, which uses a variable resistance, variable capacitance or variable inductance to modulate the carrier.

However, both types involving to some degree, the generating transducer frequency being used as a modulator. With both types the basic design problem is to create a unit that produces a useful output without the necessity for amplification. Many early transducers required considerable amplification that added weight, space and complexity to the system.

► **Calibration Factor**—It is vital to calibrate the system instruments with their respective transducers attached, since in many cases the transducer provides a slight drop in the electromagnetic energy readings. A reasonable check can be accomplished on an instrument by a low-torque potentiometer, even though the latter has a longer mechanical life span. A bubble meter device for this purpose is a simple electromagnetic coil where field is covered by the field of a magnetic material. A widely used method

is achieved at 40,000 Hz, data are transmitted to ground as vehicle altitude drops as high as Mach 2.4 during drop.

For the purpose is so-called "Mach meter," combining about 75 percent metal, 4 percent copper and 1.5 percent aluminum. The ferromagnetic alloy has an extremely high permeability (μ, from which it takes its name) and is used widely to reduce errors due to hysteresis.

Mo metal may be attached to the needle of an instrument, or mounted as a support on a rotating shaft. Used in conjunction with a variable-inductance transducer, in which the resistance of a frequency-modulating inductor is varied with a motion, this arrangement has proved highly effective. The frequency-modulating inductance often is simply the track coil of an audio oscillator, whose frequency is then varied by the position of the metal segment.

An alternative tachometer can also be produced by placing a segment of Mo metal on the shaft, adjacent to which an E coil is mounted. The frequency of the oscillator is varied over the desired range by a change of only a few thousandths of an inch in the transducer as can, both arrangements have proved highly satisfactory in transducers for accelerometers, winged instruments, slotted gyros, pressure gauges or any medium or displacement system.

► **Response**—One of the critical design problems in all forms of remote equipment is frequency response and this is true, of course, for teleprinting equipment. Most end instruments in a teleprinting system use mechanical systems in some form or other for their readings and the reaction factor, as often, damping and other losses, is a response time.

Sensitivity actually varies inversely as the square of the frequency, that is, a highly sensitive system is sluggish whereas a less-sensitive system usually has more response. Therefore, there is no straightforward solution to the problem of high-sensitivity, but responsive systems, since they are, in many respects, mutually exclusive. Tem-

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perhaps exceeding requirements, for example, have extremely slow response times. A flow-cutting coil is another example, for it requires time to establish clearly its initial and final conditions.

The transmitters, of course, have response times of equal magnitude to that of the end instrument to which it is attached. It is in this respect that variable inductance type transmitters are vastly superior to potentiometer types, because of the former's fast response time. Progress in the transmission and reception phase of telecommunication has far outstripped similar progress in the input and it is not unusual to see rigs employed in which highly developed communications equipment is used with a potentiometer type transmitter which cannot give an intelligible response during rapid changes of quantity.

► **Frequency-Independent Transmission**—Its primary and frequency error factor... since this work is usually accomplished at remote firing stations where which there is no interference.

Rapid expansion of commercial televisions, however, is causing a move to the very high end, in some cases, the super high frequency. Considerable work is now being done in the 210-220 mc. band and some experimental work in the 210-230 mc. range. However, operation in the old bands involves many difficulties in order to expect rapid for routine test work.

► **Stability Problems**—As the frequency would supply, conventional telecommunication systems use frequency modulated transmission and reception. Either the carrier itself can be frequency modulated alone, or both the carrier and its subcarrier frequency modulated. In the system, frequency modulated signals are not necessary, since the transmission through a channel is a function of the subcarrier. FM telecommunication is quite simple, but few parts are lightweight, small in size and have a comparatively low power requirement.

The principal problem with this system is stability of the subcarrier and hence, since as a single, high-speed light the test vehicle may pass through considerable range of temperature, humidity, etc., this contributes a substantial problem. Its importance is clear from the fact that a frequency shift system on the record in a change in the quantity being measured and, obviously, for serious consequences.

One successful method of solving this problem is recognition of a varying system in the receiver, which forms of the information being received for a few hundredths of a second. A frequency shift of the receiver is then apparent by a displacement of the recorded trace. This can then be accom-



Steady, steady state "open" under test by Northrop Aircraft, a crowded with instruments to give instant televisual readings of speed, rpm, angle of attack, temperature.

modated by suitable correction factors in interpretation of the data.

Schleier oscillators must have very low harmonic output, since higher harmonics cause cross talk from the other subcarriers. Second harmonic is handled simply by selecting test frequencies in such band where second harmonics fall outside the range of the other channels. A low frequency deviation is required, usually less than 1:15 percent.

The next form, representative of the modulated subcarrier are low coupling with this low deviation permitting a corresponding reduction in the post band and in the modulating frequency of the data being sent. The receiver filters, used to separate the modulated subcarriers, are also located in this low deviation either side of the center frequency.

► **Discrete Taps**—There is a variety of ways in which additional end instruments may be located in a telecommunication system. Additional subcarriers simply reduce the amount of power per channel, so that this method is suitable for highly local work only. Generally, the number of subcarriers is held to a minimum.

One suitable method for providing additional information is to use an instrumental shift in the frequency of a subcarrier. For example, a single data tap back at some of the various, difference of no matter and similar "one shot" action on which reference time is required only once during a flight may be made to display the trace of a continuous function on the recorded data.

Since the continuous function can be indicated by a sinusoidal trace, a shift in its amplitude or trace position will not interfere with its frequency. In this manner the exact time of occurrence of a physical function can be registered by the trace of the first without any effect on the last.

► **Peak-Cycle Recording**—Another widely used system of "multiplexing" is time division of the subcarrier subcarriers. In this system, a simple motor driven switch is used to permit one function to be recorded for part of a cycle while a second function is recorded for the remainder of the cycle. This is actually only a refinement of the old commutator method. Usually, the cycle is divided into a long and a short interval instead of exactly an half, so that the two rather than half of the two functions are being recorded.

It is obvious that this system of multiplexing is useful only for those functions which are not highly time-dependent. As many as four subcarriers may be used in a single subcarrier in this manner.

A variety of arrangements can be used in such a system. The switch can be located between the end instrument and the modulator, such that two end instruments can use a single modulator. Another arrangement is to provide each end instrument with its own modulator but place two modulators on a single channel. Such multiplexing methods in some careful consideration in setting time and space on the trace.

► **Peak-Position Modulation**—A second type of telecommunication is pulse position modulation, which shows ex-

relief persons for inside work because of its capacity to handle a theoretically infinite number of channels.

The pulser can be one-half to two microseconds duration and of high amplitude. Thus, the very long interval between pulses can be used to provide additional pulses. During a given interval, each channel is sampled once and transmits a pulse created by modulation.

The amount of advancement or retardation of the pulse from its static position is determined by the amplitude and polarity of the input voltage at the moment the sample is taken.

Due to the large number of readings available from the pulse-position modulation system can be obtained by ensuring that each channel occupies 10 deg. Since a synchronous system must be used, a total of 35 channels (plus the sync) can be accommodated.

If we assume a one-half microsecond pulse time and a sampling rate of 10 microseconds, then the total sampling per second (including the sync) is 1,000,000 or 277.

Correct functioning of pulse-position modulation instruments depends largely upon the accuracy of their timing circuits.

Phase doubling is, of course, used to give eight phase increments from an original four, for example. The eighth channel is used for synchronizing pulses, leaving seven channels for the multiplex transmission.

In this system it is necessary to introduce reference level surfaces to permit interpretation of the data. This is generally accomplished as a slightly more complex system which operates threshold output from its oscillator output and sees them separately.

The threshold signal is used to vary the time interval between the multiplex and each channel at an audio rate.

Good later frequency output is used to modulate a channel whose pulse output is transmitted received and demodulated to get the original transmission signal.

▼ **Vermorel-Corrad** equipment consists of PM transducer, multiplex data acquisition, audio discrimination and audio channel recording oscillographs. The latter include timing pulse, control signal, etc., to establish reference positions for the data recorded.

In general, accuracies of the order of 0.5 to 5 percent are generally available with instantaneous data the accuracy depending upon the quantity being measured (for example, the dynamic frequency constants for low rates, the latter for accuracy).

Greater accuracy is easily obtained by more elaborate and instruments and instruments, but their added cost is usually not justified.

ENGINEERING



SIMPLE panel layout would appear . . .



CLUTTERED pattern is correct use

Easy-Reading Panel Plan Offered

Interim arrangement suggested to provide functional grouping for minimizing eye travel, mental confusion.

A new instrument panel arrangement, feasible for immediate adoption, and designed to fit the psychological and functional needs of the pilot, has been offered by a West Coast aircraft manufacturer to replace "outdated" military types now in use.

The designer, Ralph H. Mues, captain-pilot and Air Force captain, is aware that "splendid results have been achieved" through an extensive instrument panel research program still being conducted by the industry. But some of the new proposals resulting from this program can become effective immediately since they call for several instruments such as the Sperry Gyro Reader, which are not yet in quantity production. Mues often has panel (dash) sketches in an aircraft, interim design to fill the gap. All instruments will be layout in a functional way.

He states his arrangement is based on conclusive psychological research data with instruments "classified to represent all flight conditions in optimum relationship to the pilot's natural response tendencies." Clarity of usage effect pilots and engineers are expressed in the design, he claims.

All instruments are placed in functional groupings and in order of importance to reduce eye travel and averaging mental patterns (dashed lines).

To minimize the pilot's "basic concept of eyeballs" and because it is the "most constant" referred to focus instrument, the gyro becomes a spot lighted in the position of greatest prominence on the panel centerline. The turn and bank indicator is located just below to preserve the equilibrium reference and thereby to minimize mental patterns of gyro malfunctions.

Next in importance are direction, air-

speed and altitude indicators, grouped around the centerline, offering "direct individual integration" with gyro bearing and heading "positive definition to equilibrium."

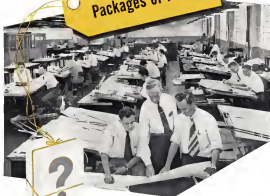
The emergency, master battery, safety compass, clock and gyro magnetic compass are positioned in a quick reference cluster, with the clock as the "hub" for planning any type of emergency problem, in the most important position. These instruments are placed on the right side to fit in with the radial indicator timing scale.

The accelerometer and air-oil-heat indicators are positioned at the extreme left side of the panel, since they are never in the order of importance based on percentage of reference during a flight. But they still are placed next to their only operationally related instruments.

Mues adds that the panel should be free of protrusions such as flanges, screw heads, buttons, dials, and that the projected horizontal and vertical center line of the individual instruments should coincide with one another. Finally, the panel should be painted a dull, dark, brown gray as a suitable background for the instruments.

"The computer has design with the black-background dash (right detail) of a type currently used by the Air Force. He claims "researchers unanimously agree that black . . . is a desirable" because of the floating effect the color gives to individual instruments. He points out the "unbalanced" gyro location (see offset centerline) disturbs the pilot's equilibrium and that the instrument layout as shown induces his efficiency and safety by creating visually overlapping mental patterns and extensive eye travel.

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General layout of Edison fire detector.

Evaluation Report

New Edison Installation for Capital

Airline equipping all DC-4s with thermocouple fire detectors after tests prove them nearly fool-proof.

Capital Airlines engineering department has decided to equip the airline's fleet of 13 DC-4 planes with Edison fire detector systems in the earliest and immediately surrounding months.

Decision is timed directly at the busy line of every airline—time lost through mechanical delay. For analysis of Capital's mechanical delay record in recent months shows that over 18 percent of all such delays is attributed to false fire alarm indicated by fire detectors.

■ 44 Units—The new Edison installation will equip seven of the thermocouple detector string like a chain of Claret more two lights around the oval ring of each engine and four thermocouples on each engine boiler, an 44 units for each plane. Total cost of the initial purchase is approximately \$10,000. But it is anticipated that the airline will quickly pay off the cost of the new installation in time saved.

Replacement of the Wobster fire detector previously used at these line times does not extend to other parts of the airplane, where Wobster and Prewitt detectors will continue to be used. Only in the more critical Zone 1, where engine vibration has caused much of the false alarm, is the Edison replacement program being carried out.

Each Wobster detector and three Prewitt detectors will continue in use in each plane.

■ Service Test—A service test of the Edison detector system on Capital's No. 419 for 700 hr. of normal flying over about 24 months, preceded the decision to purchase. No trouble was reported in that test period.

■ Service Test—A service test of the Edison detector system on Capital's No. 419 for 700 hr. of normal flying over about 24 months, preceded the decision to purchase. No trouble was reported in that test period. Meanwhile, Capital also had the benefit of additional service experience with the installation of Edison detectors on two leased DC-4s which it has rented from Northeast Airlines. The Edison aerial lanterns on these two Northeast planes are older, and are beginning to require maintenance. But during the time the Northeast planes have been in use there have been only two false test reports, and no false alarm.

Initial installation of the Edison detectors involves approximately 85 man-hours per plane, and will be accomplished in the 100-hr. engine overhaul that are now being performed on the airline's DC-4s, and on the next 1000-hr. overhauls of planes which also will be completed by the 8000-hr. check.

■ Temperature Installation—In order to make the conversion as easily as possible, it has been decided to use specially made adapter plates which will attach the Edison thermocouple unit

to the existing line, where the Wobster was attached to the oval ring. This will make it possible for the Edison to use the wiring of the Wobster. This conversion will be only temporary until the time of the next engine overhaul, when the system is completely dismantled anyhow. At that time the Wobster lines will be eliminated and the conventional open wiring system to the Edison detector will replace it.

Capital expects to get additional Edison detectors ordered in Zone 1 of its new Super DC-4s when there are received next spring and summer.

■ False Alarm—Capital engineers on past the operating principle of the Edison will make the system virtually fool-proof against false alarm which have been such a headache previously. Here's how it works:

Each detector unit produces an electric current when it is subject to a heat rise to 450 to 500 F. or over. When the normal action a sufficient strength (.004 amps) is achieved a sensitive relay in the control box, shock-mounted as the main rack in the plane's compartment. The sensitive relay itself is connected with a more powerful slave relay which actuates the flaker unit alarm in the cockpit.

■ Four Circuits—Control box has four circuits, one for each engine, and four additional test thermocouple units. Current from the detector unit has to go through these thermocouples also before the relays are activated. The four thermocouples in the control box are mounted in glass sealed tubes, and each unit includes in addition to the thermocouple a heater unit. Heater units are contained in parallel and are operated independently by a test switch on the control panel.

As part of check test procedure, the pilot holds the test switch on for a maximum of 15 sec. This tests the heater units, overcurrent, overcurrent, sufficient to develop current enough to activate in turn the four sensitive relays, the four slave relays, and the four detector lights for the four engines. Since current developed must travel along the string of detector and complete its circuit, any delay along the circuit would cause a false alarm.

■ False Alarm—The procedure of the test thermocouples in the control box effectively prevents a false alarm from one of the thermocouples in Zone 1, due to groundings the front-end due installation of the engine methods for the system, away from the vibration conditions in Zone 1, makes for more trouble-free operation. Earlier trouble reports on the Wobster in Zone 1 were traced and attributed to these principal causes.

■ Hot and Foreign Matter such as oil and water from fire engine. Detectors later were sealed against this, but trouble



Another Leader's Slogan



Eastern leaves nothing to chance! In the photo above Mr. Tony Vitale sets up-to-do seismic test equipment at Eastern's new heater test room in Miami to check a specially developed heater package for Constellation, causing a Janitrol 100,000 lbs. per hour heater. Such careful attention to every detail backs up Eastern's great emphasis on economy and dependability.

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reports continued to be received.

• Deliberate due to heat.

• Vibration.

The Wilcoaster system operates the same signal if there is a ground at any point on the circuit, and it was this which led to most of the false alarms from the Zone I installations. However, the Capital engineers point out that the Wilcoaster system is working well in other parts of the plane, and they expect to continue to use it.

The Edison thermocouples, unlike detectors of most other systems, have no contact points which can be heated up by oil, dirt or corrosion, in which case the circuitry together into contact by vibration.

Capital's new installation includes Edison relay control panel Type 117-64, and detenna coils of Type 3155-1.



For Servo Problems

Servoscope, device for analyzing, testing and synthesizing vibrations, regulation in automatic control systems, by plotting phase and magnitude responses with respect to various signal frequencies generated by instrument, is made by Sisco Corp. of America, New Hyde Park, N. Y.

Instrument accepts any carrier from 50 to 800 cps without adjustment, modulates selected carrier with any envelope from 1 to 20 cps.

For measuring d-c vibrations, either manually or remote, work set available between 5 to 20 cps. Thus, device becomes a sub-audio generator, useful for factory or lab testing of low-frequency control and for aerodynamic studies.

Yards of cellophane used in construction with dyes may be switched consecutively back and forth between input and output plates of servoscope—remote test. X-axis may be switched between electronic sweep output of servoscope and unmodulated reference signal. In effect, this permits selection of either linear or rotating pattern shift phase reading, accuracy 1 deg.

Unit operates on 115v 60c. power.



Cleans Oil Coolers

Model 301-A oil cooler cleaner, offered by Pacific Automotive Corp., 2949 N. Hollywood Way, Burbank, Calif., is designed to dissolve Varian-Suavis, chemical compound specifically developed by its use and thorough removal of particulate types of soil found in aircraft oil temperature regulators.

Regenerator is powered by 2 1/2 hp. motor, driving 38-gpm. pump which gives valve pressure up to 50 psi. Also included is manual/hydraulic, four-way valve which permits reversible flow of cleaning fluid. Special nozzles are provided at the inlet and outlet valves from the cooler. Instructions include 24-100 psi. gauge to indicate pump and filter pressure.



Radio Tester

To speed up and simplify aircraft radio testing, Shuman's Wireless Telegraph Co. Ltd., Chichester, Essex, England, has developed Type GA-218 radio equipment tester.

Equipment is contained in steel cabinet measuring 4 1/2 x 14 1/2 in., and includes beat frequency oscillator, output power meter, artificial aerials and special direction finder test set. At base of tester is row of standard battery connections to those on radio units in aircraft. This feature enables cables to be removed from plane and quickly plugged into tester for checking under test conditions without leaving aircraft. Two boost compensating plug-in sockets, volume control and switching

arrangement are provided, but can be removed to permit installation of units in aircraft units for testing.

Letdown switches indicated on tester are: (A) Audio battery test frequency oscillator, (B) external test frequency, (C) signal generator, (D) loop aerial, (E) direction finding test set, (F) pilot's and operator's moving box, (G) artificial aerial for transmission, (H) output power meter, (I) artificial aerial for receiver, (K) volume regulator, (L) instrument boost plates, and (M) receiver under test.

Although tester has been specifically designed for Shuman's Type AG-110/2702 radio equipment, it can be adapted for testing other types.



Drawing Board

Performance drawing board, offered by Cal-Pac Corp., 1111 S. Broadway Ave., Alhambra, Calif., features Douglin Aircraft Co. Inc.'s hexapod or second construction and is stated to weigh only 5 lb. in each conventional board.

To afford strength and resistance to warping, product has plywood surfaces bonded to hexapod and honeycomb, with wood grain running in different directions, and is available in sizes from 11 x 17 in. to 51 x 51 in. Stange edge and gear rack aligner are optional.

Picks Up Waste

All purpose, heavy-duty sweeper, at the \$60, manufactured by Wilshire Power Sweeper Co., 4617 Algon St., Los Angeles 26, Calif., is designed for outdoor and indoor maintenance at factories and airports.

Stated to reduce cleaning and maintenance costs up to 75 percent, sweepers can pick up sand, dirt, nails, belts, welding rod bits, paper, pay bottles, leaves and other debris. Machines have vacuum attachment and special guide which permits sweeping close to walls and machinery without passing or sweeping.

Coming in two models, 36-in. sweepers is powered by 5 hp., 4-cycle, air-cooled engine, while 48-in. unit has 8 hp. engine. Units are designed of heavy steel plate and equipped with "finger" belt controls.

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	OT	\$10.44	\$14.44	\$14.34	\$7.34	\$14.34
New York-Chicago	OW	\$10.71	\$15.40	\$15.40	\$7.73	\$15.40
	OT	\$10.75	\$15.50	\$15.40	\$7.83	\$15.40
Washington-Pittsburgh	OW	\$10.45	\$15.30	\$15.34	\$7.54	\$15.34
	OT	\$10.50	\$15.40	\$15.34	\$7.64	\$15.34

AP for above reduction of Federal tax.

OW (One Way); OT (Round Trip)

*Capitol Airlines Figures.

Airlines Helped by Rail Rate Rise

Some aircraft tariffs now below rail fare, giving air carriers better chance to capture more of travel market.

By Charles Adams

Domestic airlines may soon capture the bulk of first-class inter-city passenger traffic as a result of steadily increasing railroad fares.

The airlines, which handled about 90 percent of the first-class interstate carrier passenger business via Pullman and parlor air cars as late as 1945, are expected to retain less than 60 percent of the traffic this year. Next year, the airlines hope to lose very close to half of the first-class travel market.

Rail Rate Increases—Transportation for a national decline in rail passenger business have been highlighted by the Interstate Commerce Commission's recent decision raising 12.5 percent first-class Pullman rates. The increase, the third since the war, brought basic rail coach fares east of the Mississippi and north of the Ohio and Potomac rivers to \$3.75 cents a mile and parlor and sleeping car rates to 4.5 cents a mile (plus Pullman charges).

ICC was sharply split on granting the new fare hike. Of the ICC members voting, six favored the increase and four were opposed. The dissenters noted that the latest rate rise will put rail coach fares almost twice as high as bus fares and slightly above the air coach level between many points.

The time has come for the railways to experiment with lower rates than higher fares, the dissenting commissioners declared.

► Doubtful Benefits—Some railroad executives question whether the new rate increase will boost revenues easily \$15 million annually, as has been est-

imated, or actually result in a revenue loss through acceleration of the post-war decline in their passenger business. Whereas airline passenger traffic rose 25 percent in the last nine months of 1946, both first-class and coach rail passenger business fell off sharply.

Airline passenger of the total first-class travel market increased from 11 percent in 1945 to 31.5 percent in 1946 and to over 40 percent in 1946. Total revenue passenger miles flown by the airlines soared from 1.4 billion in 1945 to 3.5 billion in 1946, 5.5 billion in 1946 and an estimated 9.5 billion this year.

By contrast, first-class rail inter-city passenger mileage rose from 4.2 billion in 1945 to 3.9 billion in 1946, and has since fallen to 3.1 billion in 1946 and to an estimated 3.2 billion in 1946. Rail coach traffic jumped from 16.3 billion revenue passenger miles in 1945 to 39.4 billion in 1946, but then slid to 34.5 billion in 1946 and to an estimated 35 billion this year.

With a minimum of publicity, some coach train schedules have been cancelled or consolidated with other lines as a result of falling passenger numbers. Plans for buying new luxury passenger equipment have also been shelved by some railroads.

One travel agent says \$1.5 billion in first-class passenger miles in 1945 to 3.5 billion in 1946 and has since fallen to about 3.1 billion.

Private railroads have proved the greatest challenge to airlines, buses and railroads alike in the passenger field. In 1945, the common carriers handled only about 15.2 percent of all inter-city travel, with interstates carrying the rest. During 1946, when wartime rationing was in effect, the common carriers took over 44 percent of the total passenger business, but the percentage slipped to 35.2 percent in 1946, 38.1 percent in 1947, 35 percent in 1948 and possibly only 35 or 36 percent this year.

► Rates Compared—Latest fare schedules put coaches rail rates about 44 percent above the level of June, 1946. Airline fare hikes have been much smaller.

Since 1942, airline fares (based on an average per passenger mile) have risen from 5.84 cents to an estimated 5.5 cents this year—an increase of 15.7 per-

Inter-city Passenger Traffic Volume (BILLIONS OF REVENUE PASSENGER MILES)

Year	Air	Rail	Coach	Bus	Auto
1941	1.4	9.2	36.3	33.6	204.5
1945	1.4	31.5	36.4	36.9	179.9
1946	3.1	31.5	36.9	31.6	213.6
1947	5.5	31.5	27.7	23.4	274.0
1948	5.8	31.8	24.8	23.0	293.2
1949*	5.5	9.2	25.0	25.0	304.4

* Estimated.
(Air Transport Assn. Figures)

Boats Rail Boost

Sen. Edwin Johnson (D., Ohio), chairman of the Senate Interstate and Foreign Commerce Committee, has strongly endorsed the third of ICC Chairman Charles McFarlane and three other commissioners also opposed for three railroad passenger fare increases.

Johnson, whose committee is studying air and water, as well as rail transportation problems, termed the fare hike "a horrible mistake." He said every time the common carriers raise rates, business goes down.

Commenting on legislation that the government might be asked to extend direct subsidies to the railroads, Johnson told American Ways that such a move would have no chance of success.

cent. But fares have risen about 20 percent since 1941.

Under the new rates, one-way rail Pullman fare (with lower berth) from New York to Chicago will be \$45.60 against \$46.10 for regular airline flights. Rail coach tickets between the same two points will be \$10.71 compared to \$20.50 by air coach. (See item 6 on p. 17.)

► TWA View—Commenting on the rail fare hike, John H. Clemons, TWA group vice president, declared that "passenger transportation economics seem to be favoring the airplane at a few cost cents, with an added traveling premium." TWA also expects New York-Chicago air coach service at a \$20.60 fare.

Similar truck carriers, especially Capital Lines, should also benefit from the higher rail rates. All American Airways, which operates entirely within the area of higher rail traffic, hopes for improvement in its landing traffic.

► U.S. Sent G.A.—United Air Lines President W. A. Pittenger estimates that the scheduled domestic airlines will handle 45.5 percent of all first-class domestic travel in 1949, compared with 45.5 percent in 1946, even though the overall market probably will continue to decline. He and UAL's passenger business for all of 1946 will be up about 11 percent over 1945.

Pittenger personally noted that whereas his company's costs have increased 50 percent since 1930, fares have risen only slightly. American Airlines and that of an firm had gone up in direct relation to costs since 1930, the average rate per passenger mile would be around 11 cents (instead of 5.8 cents).

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Report on Foreign Jet Transports

American's William Littlewood sees little prospect at this time of jets replacing Convairs on short hauls.

Only three of the many foreign turbojets and turbojet transport types now under development offer an immediate answer to U.S. commercial aviation needs. That is the opinion of William Littlewood, American Airlines' vice president in charge of engineering.

Littlewood's report to the AA board of directors follows his recent inspection trip to England, Littlewood noted Great Britain's turbojet Viscount and turboprop de Havilland Comet and Canada's Avro G102 Jetliner turbojet transport as the best in the design field. He said the best that

the U.S. has not seen fit to "invest" its developments into a prototype which affects on demand in this country—provided we don't wait too long.

Compton C-119D-100000 will stand that the direct operating cost of turbine-powered aircraft is not as high as long-haul domestic service will be 25 to 35 percent higher per capacity seat-mile than presently operated turbojets. "And while turbine operating costs may not differ substantially from those now incurred, turbine-powered airplanes (with their higher price tag and huge fuel consumption) cannot, in the immediate future, compete with present transports at the same passenger fare level."

The AA executive suggested that a small-scale operation of turbine-powered machines to long haul routes may be feasible if costs are changed. He said little prospect that foreign general or craft would replace American's Convaircraft on short-haul flights for some time to come. "Because the large proportion of operating time spent in maneuvering, at low altitudes, would make use of turbine engines prohibitive to the cost."

Traffic Control—According to Littlewood, air navigation and traffic control problems which only today are being worked out for conventional aircraft would be aggravated by turbo, turbine-powered planes. "They cannot extrinsically adjust to traffic delays as they exist today. A pre-planned transport equivalent to the DC-6 would turn four times as much fuel per hour in a holding stack as does the DC-6."

Thus substantial present operation of turbine-equipped planes must await introduction throughout the country of a new system of air traffic control providing long traffic holds.

Major Problems—To build a turbojet transport having about the same payload and range of the DC-6, but substantially higher speeds for enroute, luxury service, but major problems must be overcome, Littlewood declared. "Development of commercially suitable turbine engines must be completed."

"This may take three years of serious work with whole-hearted cooperation among engine and aircraft manufacturers, the airlines and the military agency presently sponsoring the engine selected for development. The engine work should be completed a year before the first production plane is flight tested."

The aircraft itself must be developed so as to ensure that all necessary requirements are standardized and that the first plane will be the best and most useful that can be built.

An advance development must be made on how the plane is to be operated—direct, indirect, traffic control, landing and takeoff standards.

Four's engine problem is becoming the entire project. "Cost of developing such a plane up to the point of production has been estimated at \$30 million," Littlewood declared.

Political Aid—"Unless at least 100 planes are built, some kind of government assistance will be necessary. It is essential that this government support—of given—be given freely in the interest of the nation, and the contribution to national defense and no detailed nor extensive governmental supervision of the program be required in return."

UAL Recommended For Hawaii Route

United Air Lines has been recommended for a new route between the West Coast and Hawaii.

In its report on the proposed Hawaiian route, Civil Aeronautics Board Member Philip W. Hays said that Los Angeles be made a scheduled stop with San Francisco on UAL's present route to Honolulu. He said that applications of Marine Navigation Co. and Pacific Overseas Airlines for Los Angeles-Honolulu routes should be denied.

Safe Decision—United was recommended for the San Francisco-Honolulu route in competition with Pan American Airways in CAB's original Hawaiian route case decision of May, 1946. At that time, CAB was split on which carrier should compete with TWA between Los Angeles and Hawaii—two board members favoring United and two favoring Hawaiian Airlines.

After examining the carrier's financial status and prospects for getting additional backing, W. Hays found that Pacific Overseas Airlines is not "fit, willing and able" to conduct the proposed coast-to-coast service between Los Angeles and Honolulu. He recommended against Marine, which operates surface routes between the West Coast and Hawaii, W. Hays noted that the carrier rated its case on evidence introduced in CAB's original hearing in 1944.

Marine's claims and the company would not present any financial statement of had indicated the carrier that CAB would not grant a certificate to a membership company on matters which the evidence showed.

First Star Routes

Post Office Department's proposal to grant contracts for air mail routes between Chicago, Mich., and St. Louis, Mich., and between Honolulu and Kalamazoo, Mich., T. H., has been approved by the Civil Aeronautics Board, which said the service will not interfere with established air transportation.

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Slick's Garment Business Pays Off

Heavy Dallas-New York fashion traffic is one reason newly-certificated freight airline is currently in the black.

Stick Airways definitely has the eye of Texas—especially its garment industry. Embodied traffic from Dallas, which boasts an annual \$67 million women's garment business, is one big reason the all-freight airline has been operating at the black since being certificated by the Civil Aeronautics Board three months ago.

Current shipments from New York have mainly been big business for air-freighters (AVIATION WEEK, Nov. 7). One carrier has been transporting about 1 million dollars a month to the Southwest and West Coast. Yet smaller firms at those parts of the country have always found it tough to crack the New York market. One reason was that delivery took too long. Too, packing was expensive, and the shippers usually had to have the garments unpacked and pressed before they could be sold.

► "Connect Albany"—So Slick cooperates with the Texas metropolitan area, it now makes a "direct flight" with one that, says a Dallas fashion industry man, "we wouldn't be able to enter the

New York and western markets." Using a specially devised garment bag, which eliminates packing and unpacking, arrival, Slick offers overnight delivery from manufacturers to retailers—a combined service which competing forms of transportation find it hard to match.

Actual demonstrations of the service was recently held at Newark Airport, where the Dallas Fashion Center held an evening showing of dresses for New York retailers. Models showed the garments as they were taken from the Slick bag, showing that no pressing was needed.

► Good Business—Sponsor of the demonstration was the New York Board of Trade, which indicated its hearty support of the flight. M. G. Griffin, president and manager of the board, said he went to demonstrate that trade is a two-way business.

The garment row set was made from textiles sold in New York and flown to Texas. In order to sell in Dallas one must also buy from Dallas. Earl Slick is making it easier for us to buy from Dallas, and that's good for New York business, as well as Dallas business.

In addition to Dallas, Slick serves 19 other cities on a schedule basis and 21 cities on a demand basis. Its schedule covers 14 additional cities, all of which are expected to be added shortly.

Slick's ground crew at Newark, head point for eastern railroad traffic, has been shaving time off the speedy handling of cargo which applies to air freight. While the average take to load 10,000 lb into a C-46 is one hour, a previous crew on occasion has unloaded 10,000 lb and put on 11,000 lb in 25 min. Frequent training methods at the terminal also help to cut time in unloading from truck, surface, and load set on aircraft. Probables, such as firehoses, drags and catapulted air conditioners, are linked with the C-46's belly compartment, which has a 1750 lb capacity.

► Flown From Coast—While Slick has been building up a steady Texas-New York-airfreight business, it has not neglected the transcontinental market. Garments again are a big source of revenue, but the West Coast's lower industry, is proving to be an enthusiastic air freight user and supporter.

By word and deed, western buyers' groups could not expect their market to stretch past the Midwest because of the perishable nature of its commodity. Now, they say, using air freight to reach the eastern market has almost

doubled business. Although Slick is handling a large volume of lower business, Flying Tiger Line did much of the pioneering in selling no freight or flower shipments.

Because of its comparatively good financial picture—the carrier turned the profit corner last summer—Slick has selected proposals from several scheduled lines which offered to buy out the freight carrier.

Earl Slick emphatically denied reports that he is making to dispose of Slick Airways. As a matter of fact, the company, which flew 4,539,210 ton miles in its three months ended Oct. 31, has announced plans to buy six more C-46s.

By agreement with Pan American Airways, Transcontinental Airlines System, and Air France, Slick acts as a domestic carrier for the international airports, getting up and delivering freight at the location of the U.S.

Currently, the carrier has 975 employees, 10% of whom are pilots.

Italian Line Gets Grant From ECA

Economic Cooperation Administration procurement authorization to begin contract for one-month service, engines, parts and equipment climbed well above the \$50 million mark, with a recent \$4.5 million allotment to Linceo Aero Italiana.

The Italian carrier, which hopes to start regular service between Rome and New York only next year, asked for the money mainly for the purpose of procuring the purchase of three four-engine U.S. aircraft.

LAI originally planned to buy DC-6s but now expects and General Electric because of their immediate availability.

Established in 1946, LAI is owned 49 percent by the Italian government, 49 percent by TWA and 2 percent by private Italian interests. It has been operating domestically in Italy since 1947 and now hopes to tap the heavy 1950 Italy Year travel between the U.S. and Rome.

The carrier has not yet asked the Civil Aeronautics Board for a U.S.-Rome design air carrier permit. However, CAB recently gives expeditious treatment to such requests when they are filed.

Through Sept. 30, ECA had made available about \$50 million in aircraft procurement authorization. The distribution (including the recent LAI grant) was France \$25.7 million; the Netherlands \$27.8 million; Belgium \$2.6 million; Italy \$29.0 million; Greece \$30.0 million; Denmark \$30.0 million; Norway \$30.0 million and Ireland \$30.0 million.



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More Rules

CAB tightens its hold on nonstop by checking secret tie-ups and aids.

Secret new federal regulations to put nonstop scheduled airlines from maintaining secret and illegal tie-ups for traffic guarantees against will become effective Dec. 10.

Giving a "substantial amount" of regular service and other nonstop activity by large regular carriers, the Civil Aeronautics Board said the nonstop operations frequently are considered through ticket or travel agents. New rules were previously proposed by CAB last April and not continued in amendments to Parts 201 and 202 of the Board's Economic Regulations.

Common Agreements—According to CAB, the third aspect is because in representing to the public that its sales tickets by air between designated points on a regular or frequent basis. Several large regular carriers, acting under common agreements with the ticket agencies, furnish transportation for groups of passengers assembled by the agencies.

This activity, if conducted by the nonstop schedule, may cause the loss of irregularity, CAB contended. "But whatever the opportunity in many instances have been both frequent and regular."

CAB said it has always considered such combined arrangements and operations a violation of the purpose and intent of the economic regulations. The Board declared that new and specific prohibitions against such activities are now being made for the first time of classification.

Ticket Rule—As amended, the regu-

lations will prohibit large amounts from carrying passengers to whom approved ticket rules have not been issued. Each ticket must contain the name and address of the carrier furnishing the service, name and address of the passenger, date of sale, date of flight, origin and destination points, and the total actual cost.

To keep its letter of authorization, an irregular carrier must adhere to writing all agreements pertaining to distribution and guarantee of passenger traffic.

Passengers to or from points furnishing passengers must be made only on the basis of written bids or contracts covering specific transportation. Further, the nonstop will be prohibited from entering into any arrangement or understanding with other air carriers in such an agreement would result in the holding out of transportation "wholly or substantially by a single carrier, could take it out of the classification of an irregular carrier."

Board Warning—Branch of any of these tickets will constitute cause for revoking a nonstop's letter of authorization and withdrawal of its operating authority, CAB warned.

In addition, nonstop will be required to file with CAB specific information concerning services they conduct in cooperation with other irregular lines or with airlines handling arrangements for forwarding transportation by large regular carriers. A copy of such information, covering, for example, an other pathway involved, and a copy of each memorandum or notice issued by a large irregular carrier, must be given to CAB every three months along with the company's flight report.

Cargo Storage

Northeast Airlines has established a chain of flexible refrigerated storage

centers for perishable cargo at key points along its transcontinental system.

Two refrigerated trailers, temperature-tolerant for storage of various temperatures as low as 12 degrees below zero, will each be capable of storing 6400 lb of cargo at one time. They will have a 600 cubic foot minimum capacity

SHORTLINES

► **Bonanza**—CAB has approved an agreement whereby TWA will transfer its operating rights between Phoenix, Ariz., and Las Vegas, Nev., to the latter line. The Board, in awarding Bonanza a three-year certificate between Reno, Nev., and Phoenix last spring, and the franchise would not be issued until a satisfactory arrangement was made with PWA. Bonanza began to begin actual scheduled DC-3 service between Reno and Phoenix shortly.

► **CAB**—Member Harold A. Jones recently made a trip to Alaska to study the territory's air transportation needs and make preliminary arrangements of its initial postal carrier.

► **Compañía Mexicana de Aviación**—First certificate authorizing a foreign post agency to perform work on U. S. streets has been issued by the Civil Aeronautics Administration to CMA, a Pan American Airways affiliate based in Mexico City.

► **FAMA**—A CAB committee has recommended that the American carrier be given a temporary foreign air carrier permit authorizing service between Buenos Aires and New York via San Paulo (via Rio de Janeiro, Belo Horizonte, and Havana for air service).

► **Monarch**—Approval of a MAIL Airline Airways design has been recommended by CAB public counsel pro-

vided that Monarch activities all of America's under most segments within six months after the first gift card service from the Board. Public counsel also recommended that the merged company be given a connecting link between Chicago, N. Minn., and Washburn, Ark. Monarch plans to acquire all of America's outstanding capital stock.

► **Northwest**—Has suspended scheduled daily cargo service between New York, Monarch and Havana with C-54. Flag stops will be made at Washington and other cities served by NAC to capture 100 lb or more of cargo.

► **Northwest**—Is trying to dispose of three DC-4s. Meanwhile, two of the ships have been leased to Capital Airlines for 60 days.

► **Northwest**—Has asked CAB permission to start coach service Dec. 1 between Portland, Seattle and Honolulu with 44 passenger DC-4s at a one-way fare of \$112, compared with a regular rate of \$165 via intermediate equipment.

Pan American Airways previously proposed a West Coast-Brazil DC-4 coach operation starting at the same time. It bombs on NW's new Starliner flight to Honolulu as \$25.

► **Pan American**—Has applied for DC-3s on Caribbean routes with Coast equipment. Of 46 DC-3s in FAA had on Latin American routes in 1945, only nine now remain operating in Central America and Colombia where they can be used into small airports. None of the Latin American carriers' DC-3s was ever as an accident involving a passenger fatality, and they had carried about three million passengers.

► **Pan Am**—Has proposed a special program of "an education flight." Starting Dec. 7 the company would carry groups of eight to nine passengers between the ages of 14 and 18 years, including one adult leader in each group, at a rate of \$100 each. Plan must be approved by CAB.



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CAB SCHEDULE

New 34—Operating an unimproved
coach service (Docket 1120 in 40)

See 4—Holding an unimproved
coach service (Docket 1177)

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coach service (Docket 1177)

Air Coaches & Foreign Policy

The air coach now promises to stimulate as much controversy among trans-Atlantic carriers as it has among the major domestic airlines. But the implications of cheap international travel are greater.

Actually, of course, "coach" rates are inevitable on the main artery of the world. But the necessary and healthy open forum arguments of a democracy will be complicated, in the coming fight over mass air travel on international routes, by the added intricacies of coordinating foreign policies of the United States government and other countries.

The American Airways, which usually known exactly what its long-term objectives are at any given moment, and is trying to reach them, has sought to force the North Atlantic air coach issue by proposing a one-way tourist fare of about \$125 between New York and London for a six-month period. It was Pan American, also, which took the initiative a few years back in forcing trans-Atlantic fares down from a passenger rate which had been proposed by British Overseas Airways Corp., and adopted by the U. S. international carrier.

The Civil Aeronautics Board is now sitting impartially and fully exposed to the scrutiny of our own government on announcements of foreign policy, the governments of other nations, the International Air Transport Association and our own U. S. competitors of PAA. CAB has turned down PAA's latest proposal. The fighting will go better.

Our own Transport Administration must eventually, directly or indirectly, set forth our national policy on the subject for the CAB, and the record of that Administration to date presents no encouraging evidence that business efficiency and old-fashioned common sense of a well-regarded American individualism will promptly deter mass air international airways policies—at least, not without a hard struggle on the part of U. S. business.

Despite the Administration's solicitude for our hard-pressed major European countries, many of whom are struggling to maintain their own subsidized airfares across the Atlantic, perhaps with our own taxpayers'

money, it would appear that Pan American's main weapon in this campaign for lower trans-Atlantic passenger fares is to prove that such aircoaches would not add to its financial demands from the U. S. government.

If such service can be shown to be self-sustaining, at least, the American taxpayer could become exceedingly obstinate in his opinion.

If PAA, after a trial period of low-fare operations, could present cost and income figures that would be satisfying to the proper authorities, PAA would have a powerful answer to the lead exposures of doubt being heard about its "coaches." And it would be able to offer another powerful argument to the Administration in encouraging mass tourist travel to a dollar-buoyant Continent. Even with today's air fares there is evident an important travel trend from the steamship to the airplane on the Atlantic. Still lower air rates could start a record-breaking tourist craze to the Old World.

The controversy, as it progresses, will also become again the subject of a few thoughtful aviation observers in this country who fear that the U. S.—by going too great head to other countries in the IATA and ICAO negotiations—run the risk of lowering our own technical and economic standards to the level of others, rather than bringing her less fortunate neighbors up to our own proficiency.

This fight, although it may retard truly low-fare trans-Atlantic air travel for at least a year, will help clarify several vital differences of opinion within our own air transport industry, IATA and the CAB. But in the end, even in these early days of the American welfare state, we believe that the proposition who offers the soundest evidence for a business like plan of least government subsidy will win out. The fireworks of the intervening battle will be something to watch. If Pan American sticks to its guns, and proves it can operate economically at lower fares, it and other low-fare, non-subsidized spokesmen should win. Because on this issue, eventually, U. S. public opinion will decide that U. S. foreign policy be determined.

—ROBERT B. WOOD

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